Lesson Plan
Session: 2024-25

Name of the Assistant Professor: Amandeep Singh

Class: B.Sc. 1ˢᵗ semester   **Subject:** PHYSICS

Paper : DSC/101-Mechanics   **Credit**: 3

Dates	Week	Topic
22/07/2024 to 27/07/2024	1	**Unit 1:** Introduction, Reference frames, Inertial and non-inertial frames of references, Conservative and non-conservative forces, fictitious forces
29/07/2024 to 03/08/2024	2	Concept of potential energy, Energy diagram. Stable and unstable equilibrium, Elastic potential energy, Force as gradient of potential energy, Work &Potential energy
05/08/2024 to 10/08/2024	3	Impulse, Centre of Mass for a system of particles, Motion of centreofmass (discrete and continuous), Expression for kinetic energy
12/08/2024 to 17/08/2024	4	Linear momentum and angular momentum for a system of particles in terms of centre of mass values.
19/08/2024 to 24/08/2024	5	**Collisions:** Elastic and inelastic collisions between particles, Centre of Mass and Laboratory frames.
26/08/2024 to 31/08/2024	6	**UNIT 2: Rotational Dynamics**: Equation of motion of a rigid body, Rotational motion of a rigid body in general and that of plane lamina, Rotation of angular momentum vector about a fixed axis
02/09/2024 to 07/09/2024	7	Angular momentum and kinetic energy of a rigid body about principal axis, Torque
09/09/2024 to 14/09/2024	8	Principle of conservation of angular momentum, Moment of Inertia (discrete and continuous)

Dates	Week	Topic
16/09/2024 to 21/09/2024	9	Calculation of moment of inertia for rectangular, cylindrical and spherical bodies
23/09/2024 to 28/09/2024	10	Kinetic energy of rotation, Motion involving both translation and rotation, elementary Gyroscope.
30/09/2024 to 05/10/2024	11	**UNIT 3: Inverse Square Law Force:** Forces in nature (qualitative), Central forces, Law of gravitation, Gravitational potential energy, Inertial and gravitational mass,
07/10/2024 to 12/10/2024	12	**Special Theory of Relativity:** Michelson-Morley Experiment and its outcome, Galilean transformation (velocity, acceleration)and its inadequacy
14/10/2024 to 19/10/2024	13	Postulates of Special Theory of Relativity, Lorentz Transformations, simultaneity, Lorentz contraction,
21/10/2024 to 26/10/2024	14	**MID TERM EXAM**
04/11/2024 to 09/11/2024	15	Time dilation, Relativistic transformation of velocity, frequency and wave number
11/11/2024 to 16/11/2024	16	Relativistic addition of velocities, Variation of mass with velocity,
18/11/2024 to 22/11/2024	17	Problems and doubts

Signature

Lesson Plan
Session: 2024-25

Name of the Assistant Professor: Amandeep Singh

Class: B.Sc. 3rd semester   **Subject:** PHYSICS

Paper 1: FORTRAN and Thermodynamics

Dates	Week	Topic
22/07/2024 to 27/07/2024	1	**Unit 1:** Introduction, Computer organization., Conversions decimal to binary and binary to decimal. Algorithm development, Flow charts, Program preliminaries. Fortran constant and variable.
29/07/2024 to 03/08/2024	2	Arithmetic expressions and built in function, Executable and non-executable statements, Input and output statements, Operators, IF statements, Do and Go To statements, Dimension and Arrays.
05/08/2024 to 10/08/2024	3	Statement function and function sub program, Problems and doubts. **Unit 2:** Programming for point out of Natural numbers, Range of the set of given number, Program of ascending and descending order. Mean and standard deviation
12/08/2024 to 17/08/2024	4	Least square fitting of curve, Roots of quadratic equation, Product of two matrices, Trapezoidel and simpon's 1/3 rule.
19/08/2024 to 24/08/2024	5	**Unit 3:** Introduction to thermodynamics, Zeroth law and first law of thermodynamics, Second law of thermodynamics and its significance. Carnot theorem and absolute scale of temperature. Absolute Zero and magnitude of each division on work scale and perfect scale.
26/08/2024 to 31/08/2024	6	Joule's free expansion and Joule Thomson effect, Analytical treatment of Joule – Thomson effect, Entropy, calculations of entropy in reversible and irreversible process T-S diagram, Principle of increase of entropy. Entropy of a perfect gas, IIIrd law of thermodynamics.
02/09/2024 to 07/09/2024	7	Liquefaction of gases (Oxygen, air, hydrogen and helium). Solidification of him cooling by adiabatic demagnetization. Problems, doubts
09/09/2024 to 14/09/2024	8	**Unit 4:** Derivation of clausius-Clapeyron and Clausius latent heat equations, Specific heat of saturated vapours, phase diagram and triple of a substance, Maxwell thermo dynamical relation. Thermodynamical function: Internal energy, Helmholtz function, Enthalpy, Gibbs function. **ASSIGNMENT**

Paper 2 : Optics

Dates	Week	Topic
16/09/2024 to 21/09/2024	9	Derivation of thermodynmical relation from thermodynmical function Application of Maxwell's relation, Deduction of theory of Joule Thomson effect. Problems and doubts.
23/09/2024 to 28/09/2024	10	**Unit 1:** Interference by Division of wave front. Young's double slit experiment, Coherence, Conditions of interference, Fresnel's biprism and its applications to determination of wavelength of sodium light and thickness of a mica sheet.
30/09/2024 to 05/10/2024	11	Lloyd's mirror, Difference between Bi-prism and Lloyd mirror fringes. Phase changes on reflection stoke Law, Numerical problems. Discussions of questions and doubt
07/10/2024 to 12/10/2024	12	**Unit 2:** Interference by Division of Amplitude: Thin film, Plane parallel film. Interference due to transmitted light. Wedge shaped film, Newton's rings.
14/10/2024 to 19/10/2024	13	Interferometers: Michelson's interferometer and its application to. Standardization of a meter. Determination of wavelength, Numerical problems, Discussions of questions and doubt
21/10/2024 to 26/10/2024	14	**Unit 3:** Huygens-Fresnel's theory, fresnel's assumptions. Rectilinear propagation of light, Fresnel's half period zones, zone plate. Diffraction at a straight edge, Rectangular slit and diffraction at a circular aperture **MID TERM EXAM**
04/11/2024 to 09/11/2024	15	Diffraction due to a narrow slit, Diffraction due to a narrow wire. Numerical problems. **Unit 4:** Fraunhoffer diffraction: one-slit diffraction. Two slit diffraction, N-slit diffraction. **ASSIGNMENT**
11/11/2024 to 16/11/2024	16	Plane transmission granting spectrum, Dispersive power of grating. Limit of resolution, Rayleigh's criterion
18/11/2024 to 22/11/2024	17	Resolving power of telescope and a grating. Numerical problems. Discussions of questions and doubt

Signature

Lesson Plan
Session: 2024-25

Name of the Assistant Professor: Amandeep Singh

Class: B.Sc. 5th semester   **Subject:** PHYSICS

Paper: Quantum Mechanics

Dates	Week	Topics
22/07/2024 to 27/07/2024	1	**Unit-1** :introduction, Scale of Quantum physics, Boundary between classical and quantum phenomena, Photoelectric effect , Compton effect, Frank Hertz expt,
29/07/2024 to 03/08/2024	2	de Broglie Hypothesis, Devision and Germer expt , G P thomson expt Phase velocity and group velocity and their relation Heisenberg uncertainity principle , time energy and angular momentum Uncertainity principle from de broglie wave
05/08/2024 to 10/08/2024	3	Gamma ray microscope , electron diffraction from a slit Derivation of 1D time dependent SWE Time independent SWE , eigen value and eigen function Orthogonality and normalization of a function Expectation value of a dynamical quantities , probability current density
12/08/2024 to 17/08/2024	4	**Unit -2:** Free particle in 1D box , eigen function and eigen values Quantization of energy and momentum , nodes and anti nodes Zero point energy 1D step potential $E>V_o$, 1D step potential $E<V_o$ 1D potential barrier $E>V_o$ 1D potential barrier $E<V_o$
19/08/2024 to 24/08/2024	5	Solution of SWE for Harmonic oscillator. Wave equation for ground state and excited state, doubts and problems
26/08/2024 to 31/08/2024	6	**Unit-3** Absorption and emission of radiation Main features of a laser , directionality High intensity , high degree of coherence Spatial and temporal coherence , Einstien coefficients and possibility of amplification Momentum transfer Life time of level Kinetics of optical absorption
02/09/2024 to 07/09/2024	7	Population inversion, Resonance cavity , laser pumping Threshold condition for laser emission , Line broadening mechanism Homogeneous broadening , Inhomogeneous line broadening
09/09/2024 to 14/09/2024	8	**Unit -4** Ruby laser , He-Ne laser Optical properties of semiconductors , Semiconductor laser ,Applications of laser **ASSIGNMENT**

Paper 2: Nuclear Physics

Dates	Week	Topic
16/09/2024 to 21/09/2024	9	**Unit 1:** introduction, Nuclear composition, Nuclear properties Nuclear size, spin, parity, statistics. Magnetic dipole moment, quadrupole moment (shape concept). Mass and binding energy, Systematics of nuclear binding energy, nuclear stability.
23/09/2024 to 28/09/2024	10	Determination of mass by Bain-Bridge, Bain-Bridge and Jordan mass spectrograph. Determination of charge by Mosley Law. Determination of size of nucleus by Rutherford Back Scattering. Numerical problems Discussions of questions and doubt
30/09/2024 to 05/10/2024	11	**Unit-2:** Alpha-disintegration and its theory. Energetics of alpha-decay, Origin of continuous beta spectrum (neutrino hypothesis). Type of beta decay and energetics of beta decay. Nature of gamma rays. Energetics of gamma rays. Interaction of heavy charged-particles (Alpha particles): Energy loss of heavy charged particle (idea of Bethe formula, no derivation).
07/10/2024 to 12/10/2024	12	Range and straggling of alpha particles. Geiger-Nuttal law. Numerical problems Interaction of light charged particle (Beta-particle). Energy loss of beta particles (ionization). Range of electrons, absorption of beta particles. Interaction of Gamma sRay: passage of Gamma radiations through matter, Photoelectric Effect, Compton effect.
14/10/2024 to 19/10/2024	13	Pair Production, Electron Positron annihilation. Absorption of Gamma rays: Mass attenuation cofficient and its application. Numerical Problems. Discussions of questions and doubts. **Unit-3:** Linear accelerator. Tendem accelerators.
21/10/2024 to 26/10/2024	14	Cyclotron and Betatron accelerators. Ionization chamber, proportional counter, G.M counter (detailed study). **MID TERM EXAM**
04/11/2024 to 09/11/2024	15	Scintillation counter and semicounductor detector. Numerical Problems and Discussions of questions and doubt. **Unit-4:** Nuclear reactions, Elastic scattering, Inelastic scattering. Nuclear disintegration, photo-nuclear reaction.Radiative capture Direct-reaction. **ASSIGNMENT**
11/11/2024 to 16/11/2024	16	Heavy ion reactions and spallation reactions. Conservation laws, Q-value and reaction Threshold. Nuclear Reactors, General aspects of Reactor Design.
18/11/2024 to 22/11/2024	17	Nuclear fission reactors. Nuclear Fusion reactors. Numerical problems. Discussions of questions and doubts.